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Morphometric Study of Nose of Three Ethnic Groups of Rural Population of Jumla, Nepal

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Introduction

Nose is one of the most important structures in the face that has both bone and cartilages and performs major function in smell and has got profound aesthetic value as well.¹ There are various methods to study the nose such as morphometric analysis,

cephalometry, 3D scans and digitizers.² Nasal anthropometry is the measurement of the size, shape and proportion of human nose.³ In human, the part of the nose that projects forward from the face is the external nose and it is variable in shape.⁴

Nasal index is a useful tool in anthropometry to differentiate sexual,

Abstract

Introduction: The nose is one of the most important structures in the face, with both bones and cartilage, and performs a major function in smell and has profound aesthetic value as well.

Objective: This study is aimed to assess the morphometric measurement of the nose in the residents of Jumla.

Method: This was a descriptive cross-sectional study carried out among the residents of Jumla district aged 20-60 years with various ethnicities. A data gathering form with information including age, ethnicity, gender, and other useful personal bio-data was filled out for each subject. Nasal widths and lengths were measured with the aid of a manual spreading vernier caliper.

Results: There were 386 participants from different ethnic groups, of which 192 were male and 194 were female. The mean nasal length of the male and the female were 42.96 ± 3.84 and 41.84 ± 3.51 , and breadth were 34.02 ± 2.73 and 33.64 ± 2.58 , respectively. Similarly, mean nasal index in males and females was 79.52 ± 6.20 and 80.78 ± 7.27 . The mean nasal index of the Brahmin, Chhetri, and Dalit were 79.32 ± 6.70 , 79.23 ± 6.83 , and 81.85 ± 7.07 respectively.

Conclusion: There was sexual dimorphism observed. The ethnic group Dalit had higher values. All the ethnic groups, including males and females, have had a similar type of nose, i.e. Mesorrine in the present study.

Keywords: Anthropometric; ethnicity; nasal index; nasal types.

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ethnic and racial variables and is an important tool used in forensic science.⁵ M. Broca in 1878 discovered that the nasal index is one of the best for the purpose of distinguishing the various races of mankind and human nose appears in different sizes and shapes due to ethnic differences, which is dependent upon the environmental climatic condition.⁷ Narrow noses are naturally present in dry and cold climates while broad noses thrive in moist and warm regions as results of natural selection in human evolution.⁸ Thus, nasal index corresponds with nasal size, oxygen utilization, average temperature and humidity in different regions.⁹

However, there are limited researches available especially in the mountainous regions of Karnali province, Nepal. So, this study is aimed to assess the morphometric measurement of the nose in the residents of Jumla and compare the variations of nose among different ethnic groups predominant in the Jumla district (Brahmin, Chhetri and Dalit).

Methods

An analytical cross-sectional study was carried out from Magh 2081 to Ashwin 2082 among the residents of Jumla district age group ranging from 20-60 years with various ethnicity. The ethical clearance was obtained from the Institutional Review Committee, of Karnali Academy of Health Sciences (KAHS), Jumla, Nepal.

A data gathering form with information including age, ethnicity, gender and other useful personal bio-data was filled for each subject after taking the verbal and written consent. Nasal widths and lengths were measured with the aid of manual spreading vernier caliper [MODEL: AC120-012-14 WEIGHT: 0.86kg PACK DIM: 43.20mm x 13.20mm x 3.20mm UPC: 6009515863913] by a single observer to avoid errors using the standard method described by Anas and saleh. The individual participant was seated in a relaxed position with his or her head positioned anatomically (face anteriorly) and measurements taken. Nasal width was measured and recorded as a straight distance from right ala to left ala and nasal height measured as the distance from the nasion to the sub-nasale. Vernier caliper was used to measure the dimensions of nose. It is a valid tool to measure length. The anthropological nasal index is calculated by using the formula mentioned below, given by Topinard.⁶

$$\text{Nasal Index} = \text{Width of nose (cm)} / \text{Length of nose (cm)} \times 100$$

In order to calculate the proportion of people with various types of nose, sample size was calculated taking 50% prevalence of a certain type of nose (to get the highest calculated sample size in the absence of relevant prior data, to our knowledge)

$$N = z^2PQ/d^2 = 1.962 * 0.5 * 0.5 / 0.052 = 386$$

The participants were enrolled using the convenient sampling technique. The participants aged 20- 60 years and belonging to the ethnic groups Brahmin, Chhetri and Dalit of Jumla and who provided the consent were enrolled. Individuals below 20 years and above 60 years, having nasal deformities including deformities, nasal polyps, septal deviation and previous nasal surgeries were excluded from the study. Moreover, the individuals having chronic nasal conditions such as sinusitis and upper respiratory tract infections

that may alter nasal shape were excluded from the study. The data collected was recorded in a proforma and entered into Microsoft Excel spreadsheet version 13. Further analysis was carried out with Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics was reported as frequency and percentage. Association between categorical variables was analyzed using chi-squared test, continuous variables with independent sample t test and ANOVA. The p value of <0.05 was considered as statistically significant.

Results

There were 386 participants from residents of Jumla district belonging to the different ethnic groups in which 192 were male and 194 were female. The mean nasal length of the male and the female were found to be 42.96 ± 3.84 and 41.84 ± 3.51 respectively. Similarly, the mean nasal breadth of the male and the female were found to be 34.02 ± 2.73 and 33.64 ± 2.58 respectively. (Figure 1). Among 386 participants among which 134 were Chhetri, 120 were Brahmin and 132 were Dalit. (Figure 2)

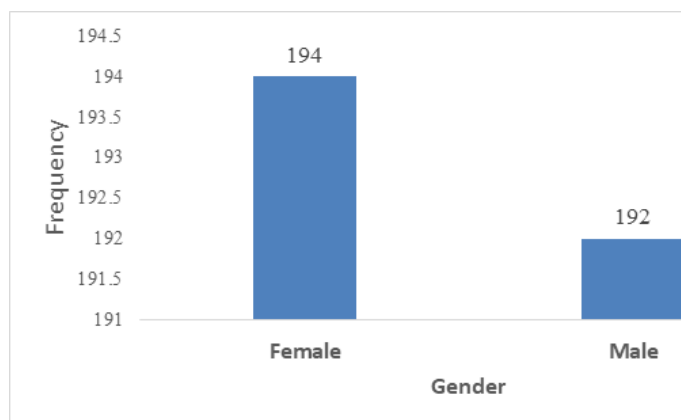


Figure 1: Distribution of participants based on gender

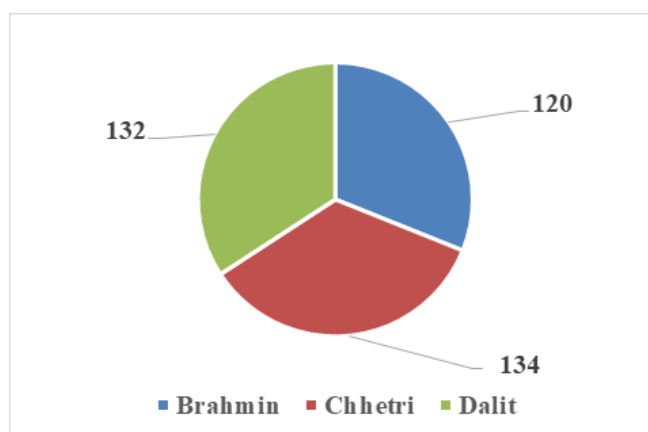


Figure 2: Distribution of participants based on ethnic groups

The classification of nasal index based on types of nose is shown. It categorizes noses into five different types namely hyperleptorrhine, leptorrhine, mesorrhine, platyrrhine and hyperplatyrrhine. (Table 1)

Table 1: Nasal classification based on the nasal index

Categories	Size of nose	Nasal Index	
		On living head	On skull
Hyperleptorrhine	Long narrow nose	40-54.9	-
Leptorrhine	Moderately narrow nose	Less than 70	Less than 47
Mesorrhine	Moderately or medium size	70-84.9	47-50.9
Platyrrhine	Moderately wide nose	85-99.9	51-57.9
Hyperplatyrrhine	Very wide nose	100 or more	58 or more

Table 2: Gender wise comparison of the variables.

Characteristics	Sex	n	Mean ± Std. Deviation	p value
Age	Female	194	36.81 ± 11.334	0.93
	Male	192	36.90 ± 11.023	
Nasal length (mm)	Female	194	41.84 ± 3.51	<0.01
	Male	192	42.96 ± 3.84	
Nasal breadth (mm)	Female	194	33.64 ± 2.58	0.17
	Male	192	34.02 ± 2.73	
Nasal index	Female	194	80.78 ± 7.27	0.07
	Male	192	79.52 ± 6.20	

Table 3: Ethnicity wise comparison of variables.

Characteristics		n	Mean ± Std. Deviation	p value
Nasal Index	Brahmin	120	79.32 ± 6.70	0.02*
	Chhetri	134	79.23 ± 6.83	
	Dalit	132	81.85 ± 7.07	
Nasal breadth (mm)	Brahmin	120	34.71 ± 2.59	<0.01*
	Chhetri	134	33.86 ± 2.40	
	Dalit	132	33.01 ± 2.73	
Nasal length (mm)	Brahmin	120	43.95 ± 3.76	<0.01*
	Chhetri	134	42.91 ± 3.30	
	Dalit	132	40.47 ± 3.23	
Age (years)	Brahmin	120	36.84 ± 10.87	0.11
	Chhetri	134	38.28 ± 11.73	
	Dalit	132	35.42 ± 10.72	

Dalit group has a higher nasal index and Brahmin and Chhetri have comparable nasal indices. (Figure 4

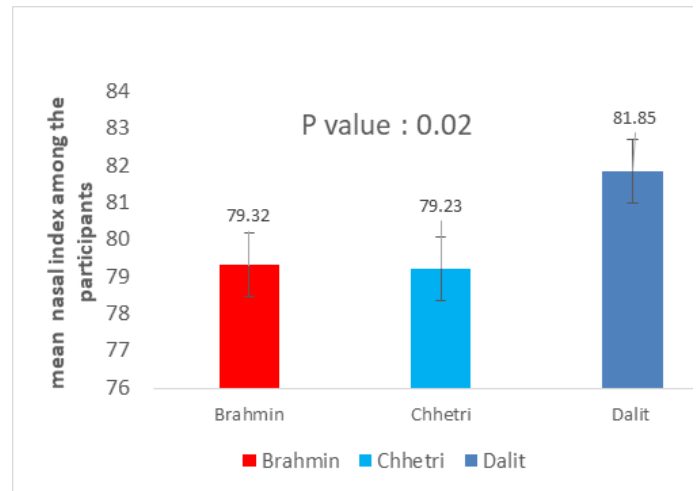


Figure 4: Comparison of nasal indices among different ethnic groups

Discussion

This study provides valuable baseline data on nasal morphology among different ethnic groups of the mountainous region of Jumla, Nepal. It includes both male and female participants from diverse ethnic backgrounds and this study offers insights into gender and ethnicity based variations in nasal index classification. In our study, the nasal index of the Brahmin, Chhetri and Dalit were 79.32±6.70, 79.23±6.83 and 81.85±7.07 respectively. This shows the nose of the mountainous population of Jumlais mesorrhine type. A similar study conducted on Tharu and Mongoloid population aged between 25-45 years Eastern Nepal, that included two different ethnic groups; concluded that the nasal index of the Mongoloid male and female were 74.6 and 75.9 respectively with Mesorrhine (medium nose) type whereas the nasal index of Tharu male and female were 83.8 and 82.4 respectively also fall under the mesorrhine (medium nose) type.¹⁰

Female have higher nasal index values than the male in this study. This shows the sexual dimorphism. These findings are also similar to the study done in Nepal by SahSKet.al. in which mesorrhine emerged as the most common nasal type in both genders and among Brahmin/Chhetri students had mesorrhine followed by leptorrhine and hyperleptorrhine.¹¹ The study of Franciscus and Long found the nasal height and width are higher in South Nigerian males than females.¹² In the present study, these parameters were not found to be statistically significant difference between males and females (Tables 1). In a study conducted in Itsekiri and Urhobo people, the results showed the Urhobos had a mean nasal index of 89.63 and the Itsekiri's had a mean nasal index of 90.74 (p<0.05), and the two ethnic group fall under platyrrhine (short and broad nose).¹³

In our study, the gender difference was minimal, suggesting that while nasal morphology may show slight gender specific variations, and it is predominantly influenced by ethnicity and environmental factors. Socioeconomic and nutritional factors also contribute to variations in nasal morphology.¹⁴ In some cultures, narrow and straight noses are considered more appealing, influencing subtle shifts in nasal morphology through intergenerational preferences.¹⁵

Variations in nasal shape and size are not merely aesthetic but serve specific physiological purposes, ensuring optimal respiratory function in diverse climates.¹⁶ Limitations of the study include, this could not cover more number of ethnic groups and age groups.

Conclusion

Males exhibited greater nasal length and breadth than females. However, the nasal index was higher in the Dalit community compared to Chhetri and Brahmin groups. Ultimately, while nose type varies by gender, the nasal index contributes little to sexual dimorphism. This study may play a vital role in providing a baseline information for reconstructive nasal surgery, rhinoplasty and, nose prosthesis while treating various population group of Nepal. The present study recommends conducting large multicenter studies involving wider geographical area and ethnic groups to establish comprehensive anthropometric reference data for Nepalese population.

Conflict of Interest: None

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